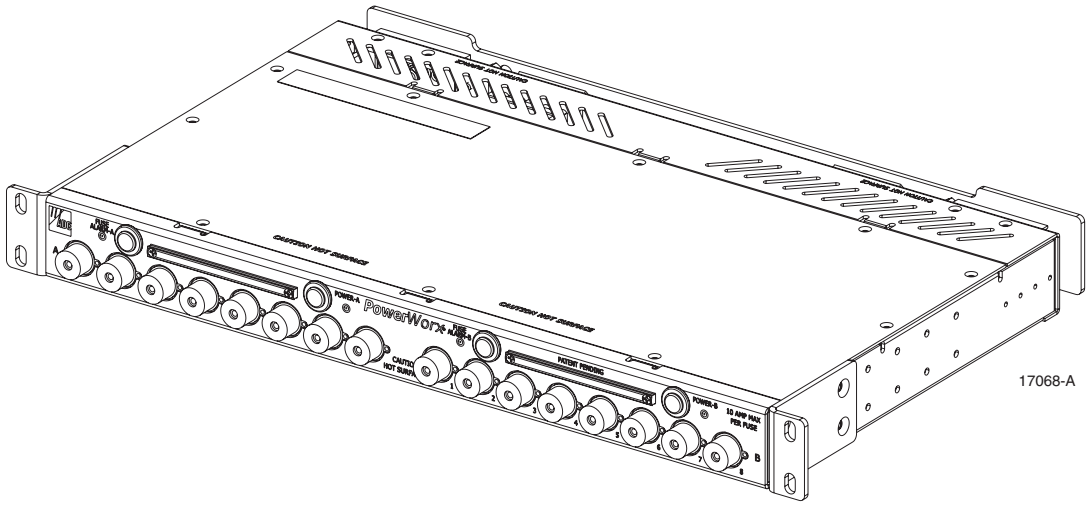
PowerWorx® Type 70 Series Power Distribution Panel User Manual



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INTRODUCTION

This manual describes the PowerWorx® Type 70 Series Power Distribution Panels and provides installation, test, operation, and maintenance procedures. Two types of PowerWorx Type 70 power distribution fuse panels are available: the **traditional** power distribution fuse panel and the **uninterrupted** power distribution fuse panel. Within this manual, the fuse panels are referred to as the "traditional fuse panel" and "uninterrupted fuse panel."

Revision History

ISSUE	DATE	REASON FOR CHANGE
Issue 1	11/2001	Original

Trademark Information

ADC and PowerWorx are registered trademarks of ADC Telecommunications, Inc.

Standards

Type 70 series fuse panels are compliant with all major standards including UL, NEC 1999, and CSA standards. The fuse panel design places great emphasis on high reliability and simplicity of operation.

Admonishments

Important safety admonishments are used throughout this manual to warn of possible hazards to persons or equipment. An admonishment identifies a possible hazard and then explains what may happen if the hazard is not avoided. The admonishments — in the form of Dangers, Warnings, and Cautions — must be followed at all times. These warnings are flagged by use of the triangular alert icon (seen below), and are listed in descending order of severity of injury or damage and likelihood of occurrence.

Danger: *Danger is used to indicate the presence of a hazard that **will** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*

Warning: *Warning is used to indicate the presence of a hazard that **can** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*

Caution: *Caution is used to indicate the presence of a hazard that **will** or **can** cause minor personal injury or property damage if the hazard is not avoided.*

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General Safety Precautions

Caution: *The fuse panel uses electrical voltage and amperage levels which, per GR-1089, may be considered an electrical hazard. Care should be exercised to assure that only qualified personnel are allowed to install, operate, maintain, or otherwise come in contact with this equipment when the panel is energized. Only insulated tools should be used on energized elements of the panel.*

Caution: *All fuse panel wiring and cabling should be connected with the system office battery input off or disconnected at the office distribution panel.*

Caution: *A replacement fuse must be the same type and must have exactly the same current rating as the fuse being replaced.*

Important Product Features

Both the traditional and uninterrupted fuse panel provide dc power over two separate buses (feeds). However, with the uninterrupted fuse panel, when one bus loses input power, the other bus supplies the output power for both buses.

Application: Type 70 series fuse panels are used to supply protected dc power to the various types of telecommunications products typically used in central offices, multimedia headends, remote sites, and other locations.

Input Power: Type 70 series fuse panels contain two buses (feeds) that accept –24 Vdc or –48 Vdc input power. The traditional fuse panel is rated at 65 Amps input current per bus for a total output current of 130 Amps per fuse panel. The uninterrupted fuse panel is rated at 60 Amps input current per bus but the total output current cannot exceed 60 Amps per panel. During back-up operation, the uninterrupted can supply an output current of up to 30 Amps per bus or one half of the 60 Amps input current provided by the working power source.

Output Power: Type 70 series fuse panels provide fuse protected output power with up to 8 fuse positions per bus. The selectable current rating for each fuse can be standard amperage capacity type 70 fuses up to 10 Amps.

Type 70 series fuse panels incorporate several important features:

- Self-configuring input voltage (–24 Vdc or –48 Vdc) capability with up to 65 Amps per bus (traditional fuse panel) and 60 Amps per bus (uninterrupted fuse panel) to simplify installation and allow their use in most dc voltage applications
- A colored indicator that projects from the center of a blown type 70 fuse to quickly and easily identify the affected fuse position
- Alarm contact connections built into the fuse panel for connection to external visual, audio, and remote alarms
- Field-replaceable high-brilliance Power-On green and Alarm red LED indicators
- Easily-removable smoked plastic protective cover over connectors to enhance safety and panel accessibility
- Two-post grounding to ensure robust and reliable ground connectivity

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Standard Equipment

Type 70 series fuse panels have two power buses (feeds). The capacity of each bus is eight fuse positions with up to 10 Amps per fuse position (within the maximum bus capacity). Each bus has Power-On and Alarm indicators on the front of the chassis and input, output, ground, and alarm contact connections on the rear of the chassis.

The current capacity of each bus of the traditional power fuse panel is 65 Amps maximum (130 Amps per panel). The current capacity of each bus of the uninterrupted power fuse panel is 60 Amps maximum (60 Amps per panel).

The power dissipation of each fuse panel is 40 watts maximum at 130 Amps.

The dimensions of each fuse panel are 1.75 inches (4.45 centimeters) high, 17.13 inches (43.51 centimeters) wide, and 10.01 inches (25.42 centimeters) deep (does not include depth of protective cover and connectors, fuses, and visual indicators that extend beyond the chassis.

Two sets of mounting brackets are provided with each fuse panel, one set for 19-inch (48.3 cm) rack installations and one set for 23-inch (58.4 cm) rack installations. The fuse panel can be flush or recess mounted in equipment racks with WECO or EIA hole spacing.

A typical traditional power fuse panel with protective cover in place is shown in Figure 1. A typical uninterrupted power fuse panel with protective cover in place is shown in Figure 2.

Fuse panels are shipped without fuses. The required fuses are available separately as accessory items.

Options

All fuse panels are available with the following options:

- Two types of output connectors: screw-down terminal strip connectors or set screw barrel terminal strip connectors
- Two types of input connectors are available: two-hole compression-lug (stud-type) or set screw barrel connectors
- The fuse panel color is either putty white or black color

Accessories

The following accessories are available:

- Standard type 70 fuses with standard values from 0.2 Amp to 10.0 Amps
- Cable management bar kit
- Four sizes of compression connector lugs for input power connections
- Fused equipment designation card kit
- Fuse designation card kit

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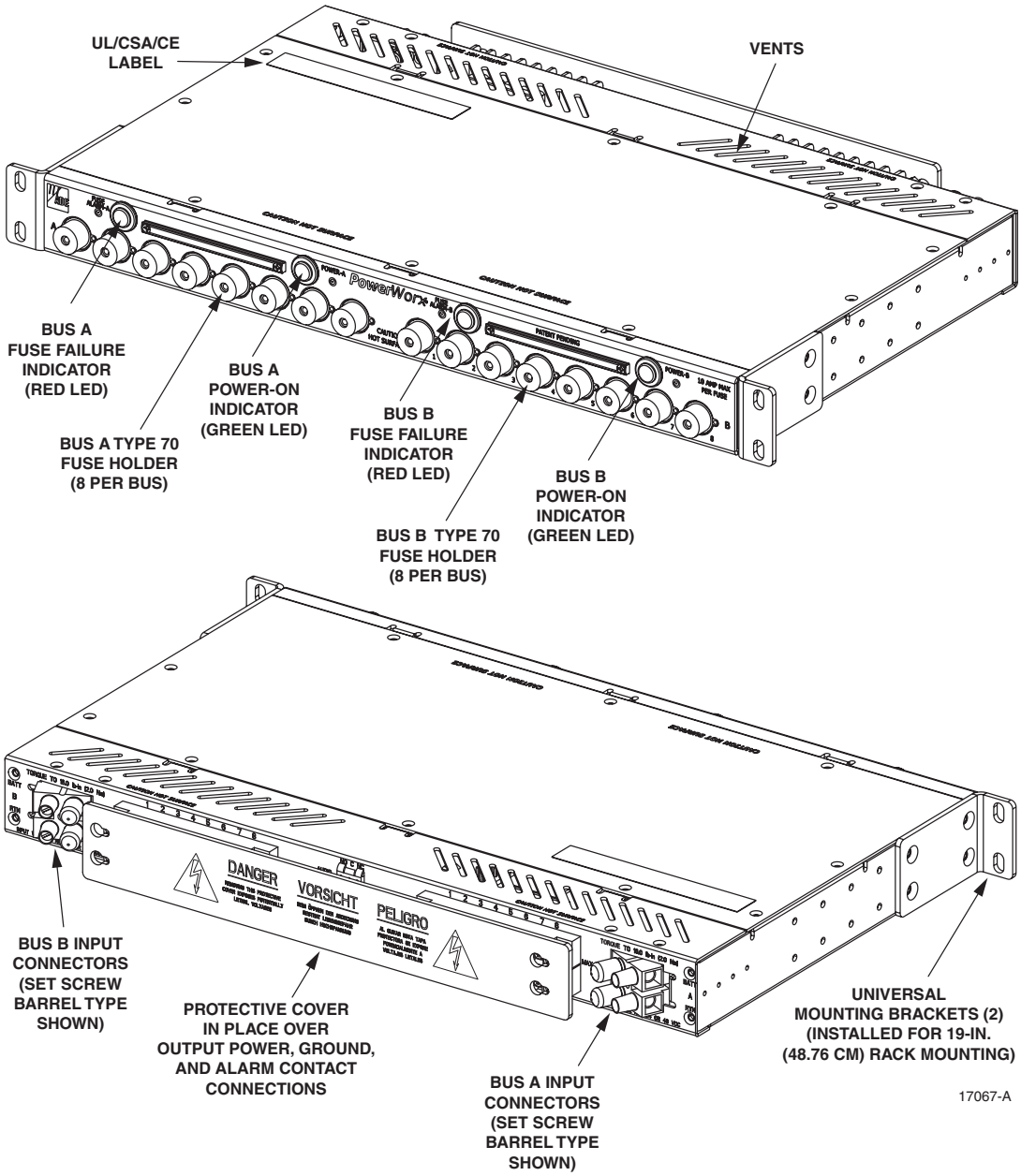
UL/CSA/CE LABEL
VENTS
BUS A FUSE FAILURE INDICATOR (RED LED)
BUS A TYPE 70 FUSE HOLDER (8 PER BUS)
BUS A POWER-ON INDICATOR (GREEN LED)
BUS B FUSE FAILURE INDICATOR (RED LED)
BUS B TYPE 70 FUSE HOLDER (8 PER BUS)
BUS B POWER-ON INDICATOR (GREEN LED)
BUS B INPUT CONNECTORS (SET SCREW BARREL TYPE SHOWN)
PROTECTIVE COVER IN PLACE OVER OUTPUT POWER, GROUND, AND ALARM CONTACT CONNECTIONS
BUS A INPUT CONNECTORS (SET SCREW BARREL TYPE SHOWN)
UNIVERSAL MOUNTING BRACKETS (2) (INSTALLED FOR 19-IN. (48.76 CM) RACK MOUNTING)
DANGER
VORSICHT
PELIGRO
17067-A

Figure 1. PowerWorx Type 70 Traditional Fuse Panel with Protective Cover in Place, Front and Rear Views (Panel with 8 Fuses Installed on Each Bus Shown)

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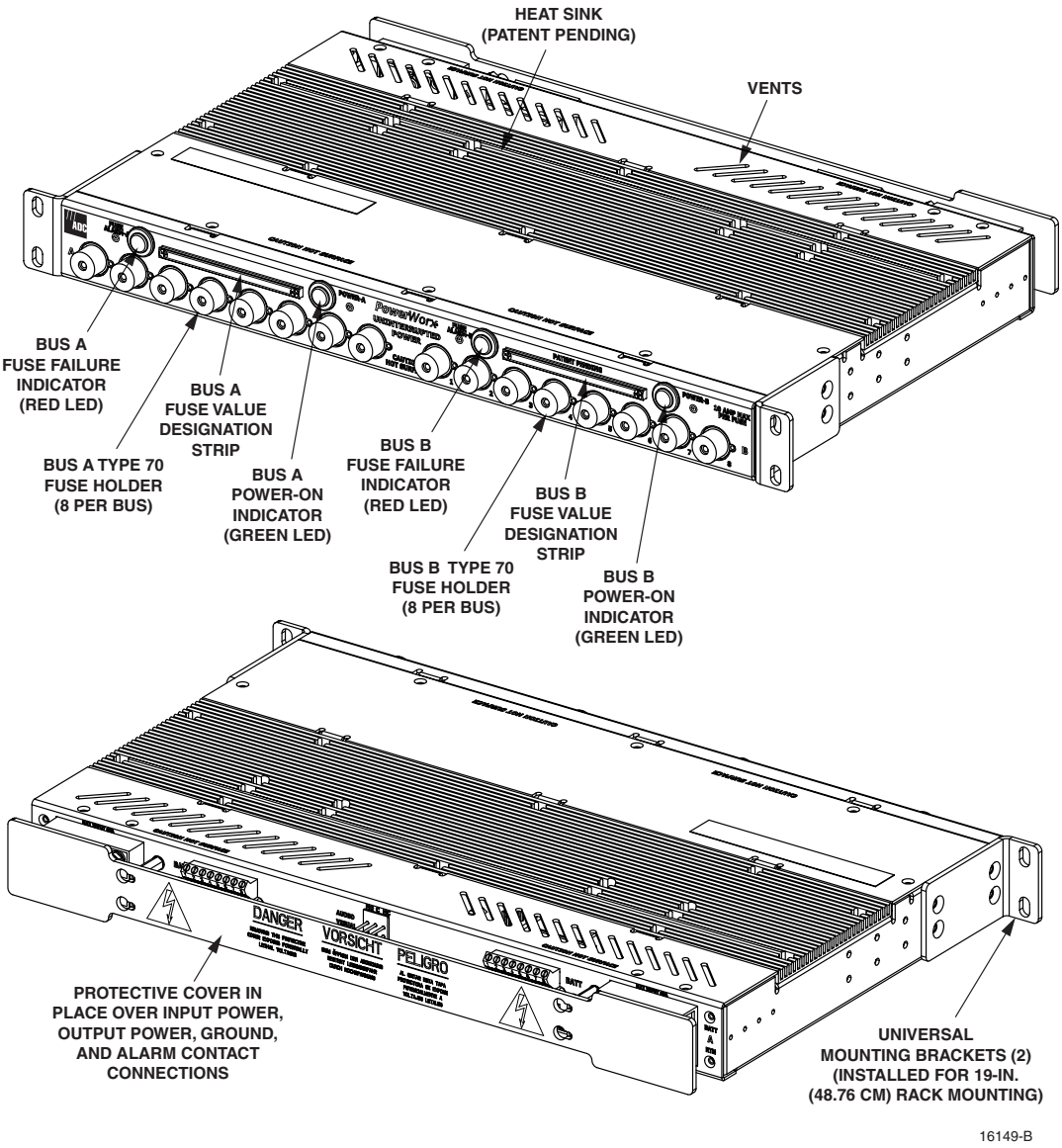

Figure 2. PowerWorx Type 70 Uninterrupted Fuse Panel with Protective Cover in Place, Front and Rear Views (Panel with 8 Fuses Installed on Each Bus Shown)

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1 GENERAL CHARACTERISTICS AND FEATURES

This section describes the general characteristics and features of the traditional and uninterrupted fuse panels. The front of a typical traditional power fuse panel is shown in Figure 3. The front of a typical uninterrupted power fuse panel is shown in Figure 4. The rear side of the traditional power fuse panel (with protective cover removed to view the optional connections) is shown in Figure 5. The rear side of the uninterrupted power fuse panel (with the protective cover removed to view the optional connections) is shown in Figure 6. Options and features other than those described may be available by special order.

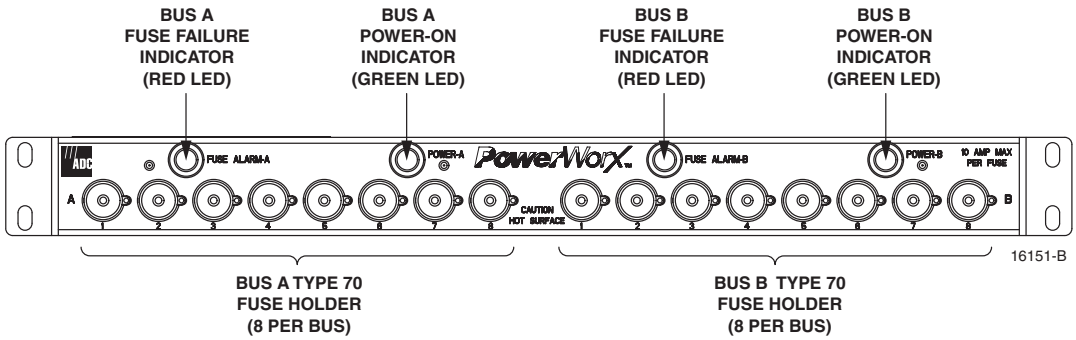

Figure 3. ADC PowerWorx Type 70 Traditional Fuse Panel, Front View (Panel with 8 Fuses Installed on Each Bus Shown)

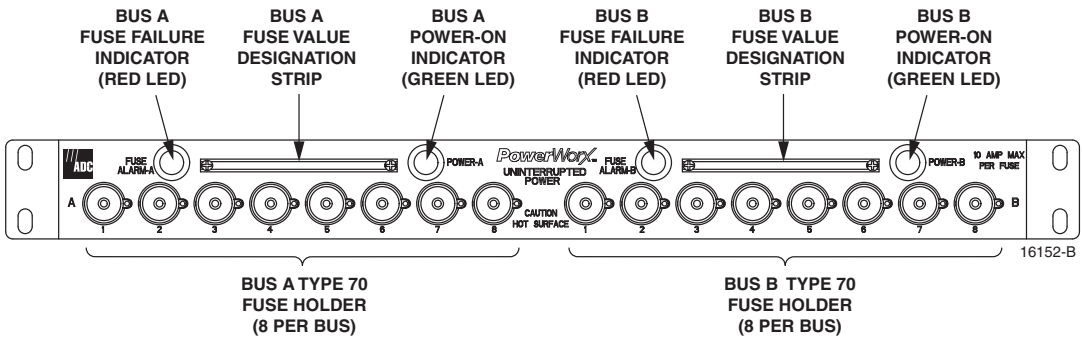

Figure 4. PowerWorx Type 70 Uninterrupted Fuse Panel, Front View (Panel with 8 Fuses Installed on Each Bus Shown)

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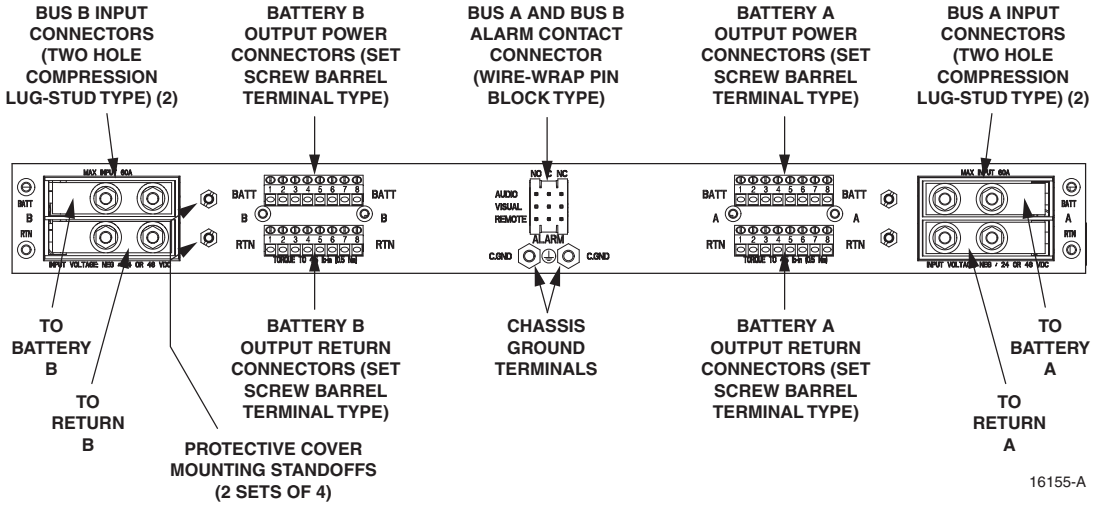
BUS B INPUT CONNECTORS (TWO HOLE COMPRESSION LUG-STUD TYPE) (2)
BATTERY B OUTPUT POWER CONNECTORS (SET SCREW BARREL TERMINAL TYPE)
BUS A AND BUS B ALARM CONTACT CONNECTOR (WIRE-WRAP PIN BLOCK TYPE)
BATTERY A OUTPUT POWER CONNECTORS (SET SCREW BARREL TERMINAL TYPE)
BUS A INPUT CONNECTORS (TWO HOLE COMPRESSION LUG-STUD TYPE) (2)
TO BATTERY B
TO RETURN B
BATTERY B OUTPUT RETURN CONNECTORS (SET SCREW BARREL TERMINAL TYPE)
PROTECTIVE COVER MOUNTING STANDOFFS (2 SETS OF 4)
CHASSIS GROUND TERMINALS
BATTERY A OUTPUT RETURN CONNECTORS (SET SCREW BARREL TERMINAL TYPE)
TO BATTERY A
TO RETURN A
16155-A

Figure 5. PowerWorx Type 70 Fuse Panel, Rear View with Protective Cover Removed (Panel with Compression Lug Input Connectors and Set Screw Barrel Terminal Strip Output Connectors Shown)

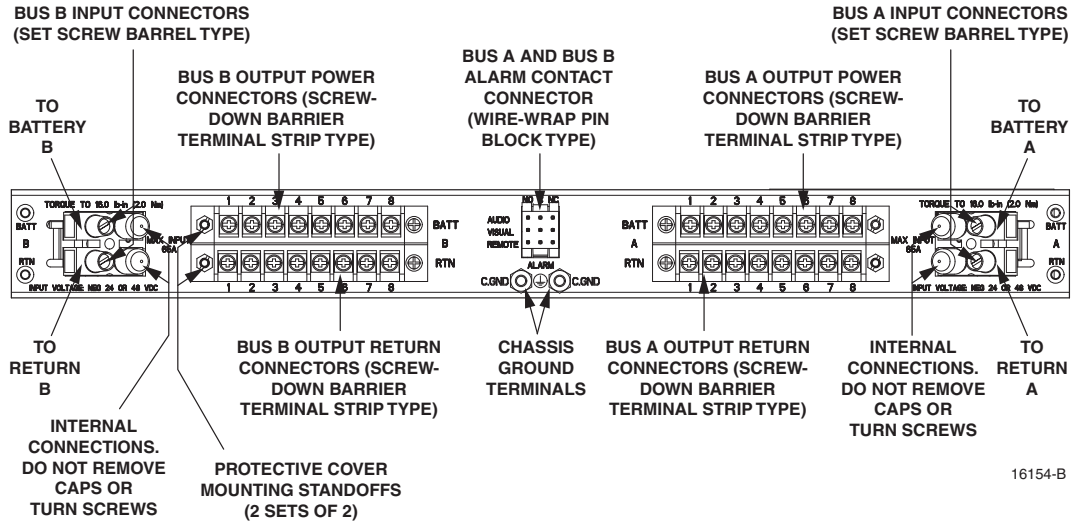
BUS B INPUT CONNECTORS (SET SCREW BARREL TYPE)
BUS B OUTPUT POWER CONNECTORS (SCREW-DOWN BARRIER TERMINAL STRIP TYPE)
BUS A AND BUS B ALARM CONTACT CONNECTOR (WIRE-WRAP PIN BLOCK TYPE)
BUS A OUTPUT POWER CONNECTORS (SCREW-DOWN BARRIER TERMINAL STRIP TYPE)
BUS A INPUT CONNECTORS (SET SCREW BARREL TYPE)
TO BATTERY B
TO BATTERY A
TO RETURN B
INTERNAL CONNECTIONS. DO NOT REMOVE CAPS OR TURN SCREWS
PROTECTIVE COVER MOUNTING STANDOFFS (2 SETS OF 2)
BUS B OUTPUT RETURN CONNECTORS (SCREW-DOWN BARRIER TERMINAL STRIP TYPE)
CHASSIS GROUND TERMINALS
BUS A OUTPUT RETURN CONNECTORS (SCREW-DOWN BARRIER TERMINAL STRIP TYPE)
INTERNAL CONNECTIONS. DO NOT REMOVE CAPS OR TURN SCREWS
TO RETURN A
16154-B

Figure 6. PowerWorx Type 70 Fuse Panel, Rear View with Protective Cover Removed (Panel with Set Screw Barrel Input Connectors and Screw-Down Barrier Terminal Strip Connectors Shown)

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1.1 Power Buses

Each fuse panel has two separate power buses (feeds). Each bus distributes the input power to the output power circuits. In each bus circuit, current flows from the input power bus, through the fuse, to the output power circuit. A typical fuse panel block diagram is shown in Figure 7.

The current capacity of each bus of the **traditional** power fuse panel is 65 Amps maximum. The output fusing of the traditional fuse panel should not exceed 65 Amps per bus. This provides a total capacity of 130 Amps per panel. The maximum current per bus is marked on the fuse panel.

The current capacity of each bus of the **uninterrupted** power fuse panel is 60 Amps maximum. However, the output fusing of the uninterrupted fuse panel should not exceed 30 Amps per bus. This provides a total capacity of 60 Amps per panel. The maximum current per bus is marked on the fuse panel.

Each of the feed buses has a capacity of eight fuse positions. Other fuse capacity configurations may be available by special order. When a fuse fails, the input power bus is disconnected from the corresponding output circuit. This causes the alarm LED for the bus to light and also opens or closes the alarm relay contacts (form C contacts).

1.2 Redundant Power (Uninterrupted Power Fuse Panel)

The uninterrupted power fuse panel provides redundant power to fused equipment through the use of Schottky steering diodes. When power to one bus is interrupted, the Schottky steering diodes enable the other bus to supply power to the entire fuse panel and to maintain output power for both buses (bus A and bus B). If bus A loses power, bus B will support the power load of bus A while maintaining its original power load. Likewise, if bus B loses power, bus A will support the power load of bus B while maintaining its original power load.

1.3 Input Voltage

The fuse panel can accommodate either –24 Vdc on both buses or –48 Vdc on both buses. The voltage level is sensed by the fuse panel circuitry. The input voltage used with the fuse panel can have the following characteristics:

- –24 Vdc nominal, within range of –21 Vdc to –30 Vdc
- –48 Vdc nominal, within range of –42 Vdc to –56 Vdc

Fuse panels for use with other input voltage and polarity power may be available by special order.

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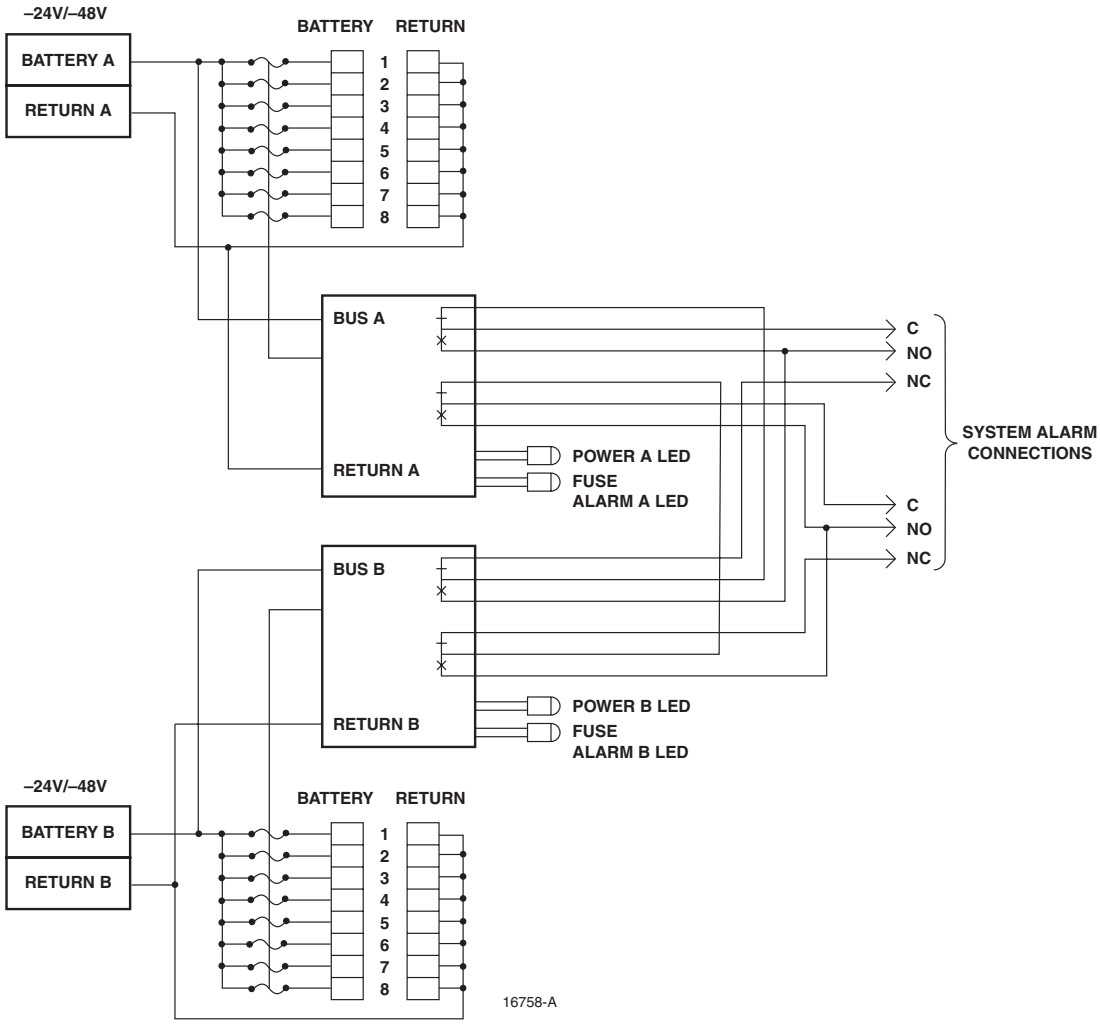

Figure 7. PowerWorx Type 70 Fuse Panel Block Diagram (Traditional Power Fuse Panel Shown)

1.4 Input Connectors

Each bus is equipped with two (2) input connectors on the rear of the fuse panel through which input power is applied. The two input power connectors are labeled BATT (battery) and RTN (return) on the fuse panel. The following types of input connectors are available:

- Two-hole compression lug (stud type) connectors: Each connector consists of two studs mounted on a plated copper bar and two nuts. Each set of studs can accept various size 2-hole lugs which can be used with a number of wire sizes ranging from #14 to #2 AWG copper wire. Various lugs are available as accessories.
- Set screw barrel connectors: Each connector has two (2) barrels. On each connector, the barrel that is closest to the outside of the fuse panel (barrel without a cap) is used to secure

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the wire to the connector. The barrel on each connector that is closest to the center of the fuse panel (barrel with a cap over it) is not used or accessed. The wire is inserted into the connector and the set screw is tightened down, compressing the wire. The set screw barrel connectors can accept up to #6 AWG copper wire.

1.5 Output Voltage

The output voltage will be the same voltage as the applied input voltage when the fuse does not fail.

1.6 Output Connectors

Each output circuit has two connectors through which the output power is accessed for connection to telecommunications equipment. The following types of output connectors are available:

- Screw-down barrier terminal strip: Eight terminals with 6-32 screws are mounted in two barrier type terminal strips per bus (one strip for input and one strip for return). The terminals are on 0.375 inch (9.525 mm) centers with a maximum distance between barriers (maximum connecting terminal width) of 0.325 inch (8.255 mm). Terminals can accept #12 to #22 AWG copper wire with crimp-on spade lug or ring connectors or wires with the insulation stripped back.
- Set screw barrel terminal strip: Eight barrel terminals are mounted in two set screw barrel terminal strips per bus (one strip for input and one strip for return). The terminals are on 0.197 inch (5.004 mm) centers. Terminals can accept #12 to #26 AWG copper wire with insulation stripped back.

1.7 Chassis Ground Connection

Two #10 studs mounted on 0.625 inch (15.875 mm) centers are provided for grounding the fuse panel chassis. This chassis ground connection can be used to attach a separate grounding conductor when mounting the fuse panel in non-grounded or non-conducting material or when required by local practice. The studs can accommodate 2-hole lugs and up to #6 AWG wire.

Two crimp ring lug terminals for use with #10 AWG wire are enclosed with the fuse panel. The fuse panel can be properly grounded using only one grounding stud.

1.8 Fuses

The fuse panel accommodates industry standard type 70 fuses with values from 0.02 Amp to 10.0 Amps in any fuse position within the maximum capacity of the bus (total fuse load cannot exceed bus capacity). The maximum fuse value that can be used in each fuse position is 10.0 Amps which is marked on the front panel.

The type 70 fuse contains a colored indicator that designates the fuse value. When the fuse blows, the indicator extends out of the fuse to indicate that the fuse has blown. Fuse panels are shipped without fuses installed. Standard type 70 fuses are available from ADC.

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1.9 Power-On Indicator

A visual power-on indicator (green LED) for each power bus is mounted on the front panel of the fuse panel. A lighted LED indicates that power is applied to the bus input connectors. An unlighted LED indicates that power is not applied to the bus input connectors. The LED can easily be replaced in the field if it fails.

1.10 Fuse Alarm Indicator

A visual fuse alarm indicator (red LED) is provided on the front panel for each power bus. The fuse alarm indicator lights when any fuse on the corresponding bus fails. The fuse alarm indicator is off when all fuses on the corresponding bus are operational. Loss of power to a bus will not cause the fuse alarm indicator corresponding to that bus to be lighted. The LED can be easily replaced in the field if it fails.

1.11 Alarm Contact Operation

Each bus contains circuitry that opens and closes a set of alarm contacts when any fuse on the bus fails or when the input power to the bus is lost. These contacts may be used to open or close a loop connected to an external alarm system.

The alarm circuitry provides Form C alarm relay contacts. During normal operation, the normally open (NO) contacts remain open and the normally closed (NC) contacts remain closed. When a fuse fails on either bus or power to either bus is lost, the NO contacts close creating a connection between NO and common (C) and the NC contacts open creating an open circuit between NC and common. The current rating for each set of alarm relay contacts (three sets are provided) is 1.0 Amp maximum.

1.12 Alarm Contact Connection

Alarm contact connections are provided through three sets of wire wrap pins located on the rear side of the fuse panel. Each set of wire wrap pins is labeled with a suggested use for monitoring the fuse panel: audio, visual, and remote. The wire wrap pins can accept #22 to #26 AWG copper wire.

1.13 Fuse Designation Strips and Perforated Cards

Plastic designation strips with clear plastic covers are mounted above the fuse holders for each bus. Four card sheets, each with three perforated strips, are provided with the fuse panel. The perforated strips may be marked with the circuit designations/fuse values for each circuit/fuse on the bus. The perforated strips are then inserted into the designation strips so that the information on the perforated strip is positioned above the corresponding fuses. Additional perforated strip cards and plastic covers can be ordered from ADC if required.

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1.14 Fused Equipment Designation Card and Holder

Two fuse designation cards, shown in Figure 8, and a card holder with a clear plastic cover are provided with the fuse panel. The card holder may be attached to the fuse panel, the fuse panel mounting brackets, to the rack, or a location close to the fuse panel. One of the cards may be filled out with circuit information for each of the circuits and inserted in the card holder. The card holder has a pressure sensitive adhesive backing for attachment. Additional fused equipment designation cards, card holders, and plastic covers can be ordered from ADC if required.

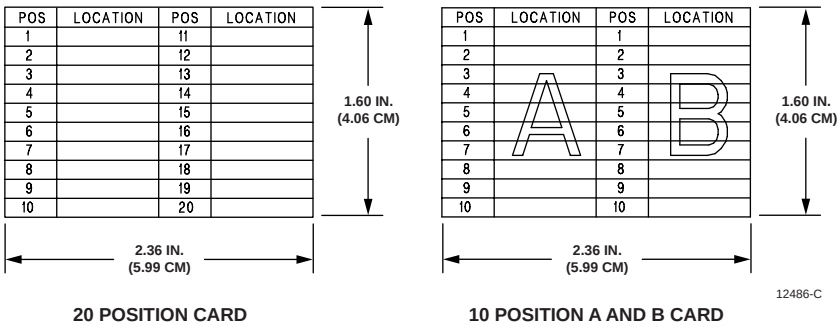

Figure 8. Fuse Designation Cards

1.15 Voltage Designation Label

A voltage designation label, shown in Figure 9, is provided with the fuse panel. The label may be filled out with the actual voltage present on the buses and placed on the panel. The voltage designation label has a pressure sensitive adhesive backing for attachment.

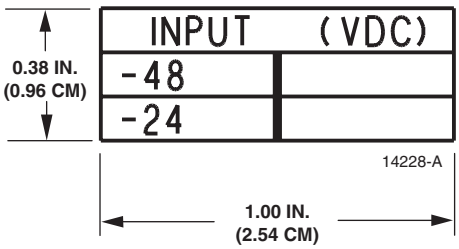

Figure 9. Voltage Designation Label

1.16 Material and Finish

The fuse panel chassis and brackets are made of 16-gauge cold rolled steel. The panel and brackets are finished with powder paint.

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1.17 Cooling

Vent openings are provided in the top and bottom of the fuse panel. The vent openings allow convection cooling of all components without the use of fans or blowers.

1.18 Protective Cover

A smoked plastic protective cover is mounted over the input power connectors, the output power connectors, the chassis ground terminals, and the external alarm contact connections. To access the connectors and terminals, the cover may be easily removed by loosening (but not removing) four screws.

1.19 Dimensions

The dimensions of the traditional power fuse panel are shown in Figure 10. The dimensions of the uninterrupted power fuse panel are shown in Figure 11.

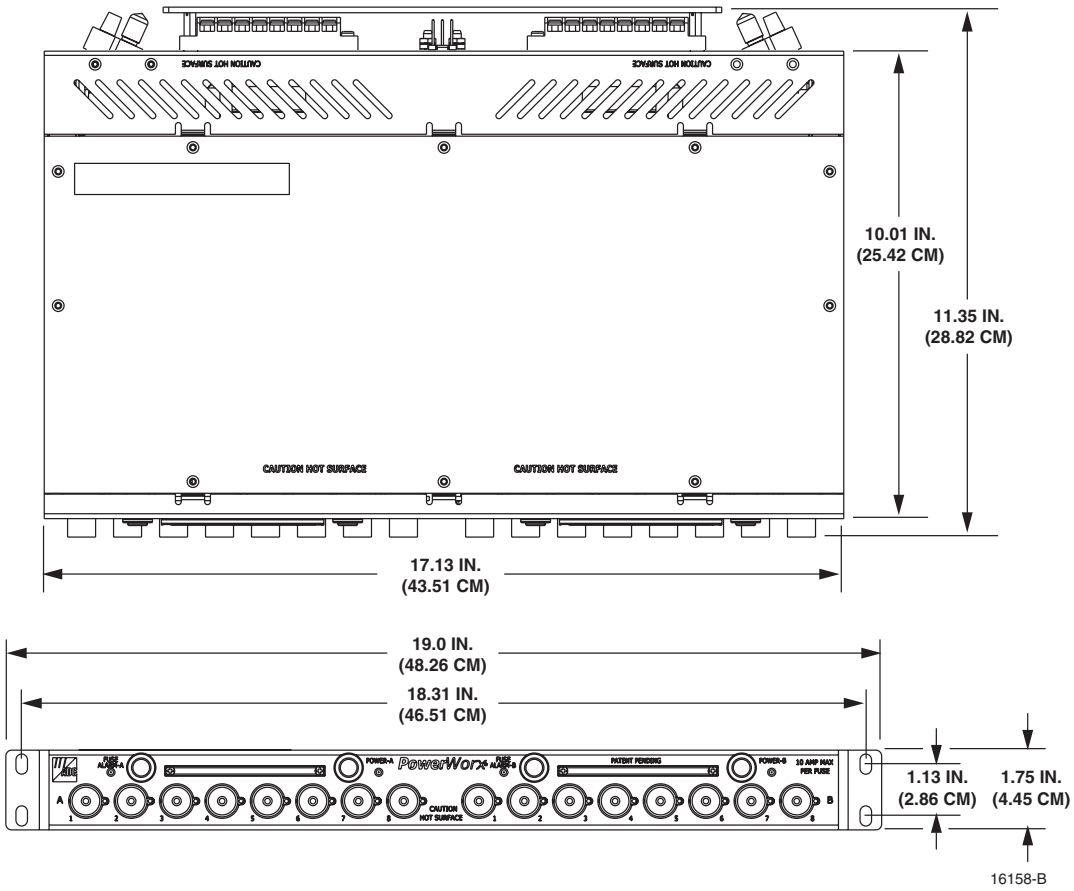

Figure 10. Dimensions of Type 70 Traditional Power Fuse Panel (with Mounting Brackets Attached for 19-Inch [48.26 cm] Rack Mounting)

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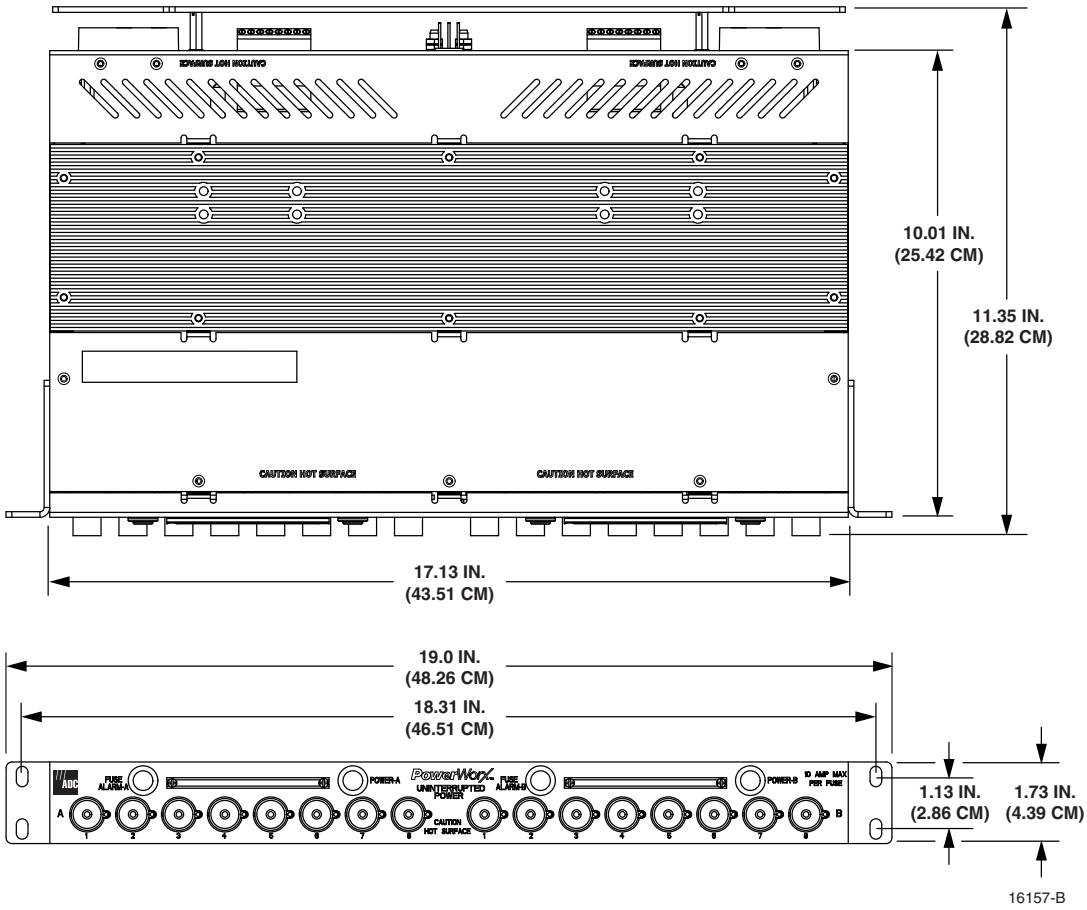

Figure 11. Dimensions of Type 70 Uninterrupted Power Fuse Panel (with Mounting Brackets Attached for 19-Inch [48.26 cm] Rack Mounting)

1.20 Weight

The weight of both the traditional and uninterrupted fuse panel is approximately 14 pounds (6.35 kilograms). The actual weights are dependent upon the configurations of the panels.

1.21 Color

The color of the fuse panel and mounting brackets is either putty white or black.

1.22 Mounting

The fuse panel can be mounted in either a 19- or 23-inch (48.26 or 58.42 cm) equipment rack. Both the traditional and the uninterrupted panel are equipped with two sets (one set for 19-inch racks and one set for 23-inch racks) of mounting brackets. The panel can be flush mounted or recessed 1, 2, 3, or 4 inches (25.4, 50.8, 76.2, or 101.6 mm) from the front of the rack. The

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mounting brackets allow mounting with WECO 1.00-inch (2.54 cm) hole spacing or EIA 1.25-inch (3.18 cm) hole spacing. The slotted mounting hole pattern in the mounting brackets compensates for vertical rack differences and allows mounting the fuse panel in either 1.75- or 2-inch (4.45 or 5.08 cm) rack spaces.

1.23 Environmental Characteristics

The environmental characteristics of the PowerWorx Type 70 Series Power Distribution Fuse Panel are listed in Table 1.

Table 1. PowerWorx Type 70 Fuse Panel Environmental Characteristics

PARAMETER	DESCRIPTION
Operating temperature	–5° C to +50° C
Storage temperature	–45° C to +85° C
Humidity range	0% to 95% humidity (non-condensing)
Altitude range	–197 ft. (0.06 km) to 13,000 ft. (3.96 km) above sea level
Fire rating	All components UL94-V1 or better
Acoustic noise	0 dBA above ambient
Heat dissipation (fully loaded traditional panel)	40 watts maximum@ 65 A per bus, 80 watts maximum @ 130 A total fuse panel load
Heat dissipation (no load)	1 watt per bus

2 ACCESSORIES

The following accessories for the PowerWorx Type 70 fuse panel are available:

- Standard Type 70 fuses with current capacity of from 0.2 Amp to 10.0 Amps
- Cable management bar with mounting screws. Provides cable tie points. Installed at rear of fuse panel by fastening ends of bar to both sides of the panel
- Four sizes of two-hole compression lugs for #2, #4, #6, and #14 AWG wire for input power connection
- Kit of perforated fuse value designation cards and plastic covers
- Kit of fused equipment designation cards, a card holder, and a plastic cover

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3 UNPACKING AND INSPECTION

Unpack and inspect the various components as follows:

1. Inspect the exterior of the shipping container for evidence of handling that may have damaged the components in the container.
2. Unpack each container while carefully checking the contents for damage and verify with the packing slip.
3. File a claim with the commercial carrier and notify ADC Customer Service if damage is detected or if parts are missing. Save damaged cartons for inspection by the carrier.
4. Refer to Section 8, Customer Information and Assistance, at the back of this manual, for repair, replacement, and warranty information.
5. Save all shipping containers for use if the equipment requires return shipment at a future date.

4 INSTALLATION

Fuse panels must be installed in a central office, equipment room, or restricted access location.

The following guidelines should be used when mounting the fuse panel in a rack.

- Mount the fuse panel in the uppermost area of the rack to reduce exposure of the power wiring.
- Provide a minimum of 1.75 inches (4.45 cm) of air space (one rack space) between the top of the fuse panel and the next item in the rack for cooling.
- Adding a fuse panel to a rack may displace a device which may require relocation.

Caution: *This equipment employs electrical voltage and amperage levels which may be considered an electrical hazard. Care should be exercised to assure that only qualified personnel are allowed to install, operate, maintain, or otherwise come in contact with this equipment when the fuse panel is energized. Only insulated tools should be used on energized elements of the fuse panel.*

Warning: *Never install telephone equipment in a wet location or during a lightning storm. When installing or modifying telephone lines, disconnect lines at the network interface before working with uninsulated lines or terminals to prevent electrical shock.*

4.1 Recommended Installation Tools

Use common hand tools, such as a Phillips screwdriver, a wire wrap gun and bits, a wire stripper, and a wire lug crimper to install the fuse panel. In addition to these tools, the following tools are recommended:

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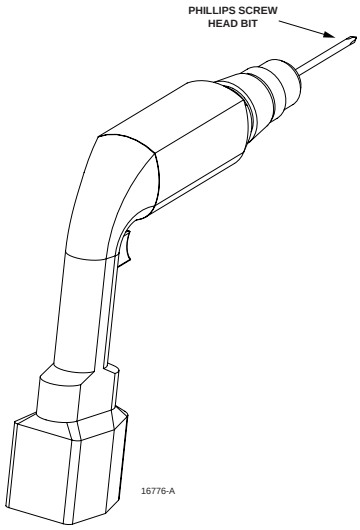
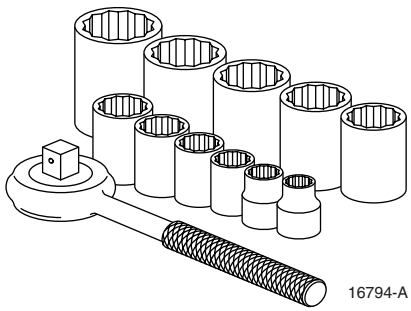
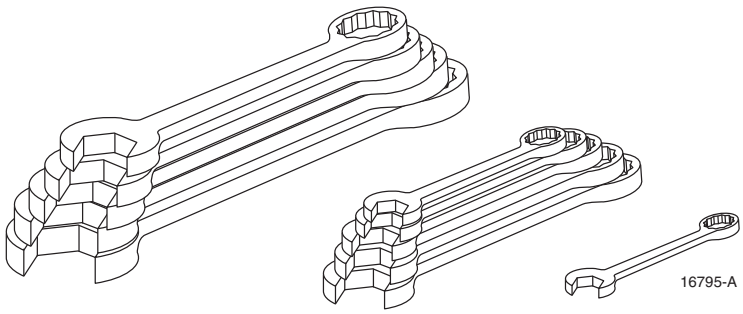
- Power screwdriver with Phillips head bit and slotted head bit



- Set of sockets and driver



- Set of open end or box end wrenches



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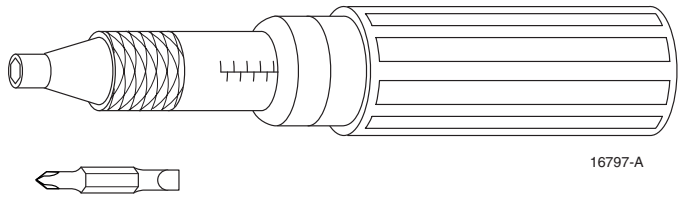
- Torque screwdriver calibrated in pound-force inches or Newton meters with Phillips head bit and slotted head bit



4.2 Use of Screws in Installation Package

Caution: *When installing the fuse panel, use only the hardware supplied with the panel. Use of any other hardware could cause damage to the panel. If parts are missing, please contact ADC.*

Several types of screws are provided with the fuse panel. The screws used with the rack-mounting brackets are thread-forming screws which help to provide a solid ground path between the panel chassis and the rack. Use the power screwdriver to install these screws.

4.2.1 Screws to Attach Brackets to Fuse Panel

To fasten the mounting brackets to the fuse panel, use the 5/15-inch (7.94 mm) long, black chromate finish **8-32** flat-head screws as shown in Figure 12. Eight screws (four for each bracket) are provided.

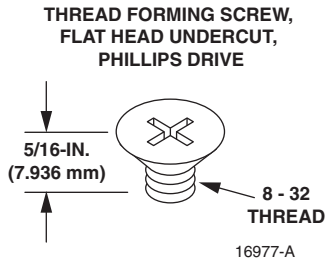


Figure 12. Screw for Attaching Brackets to Power Panel Chassis

4.2.2 Screws to Attach Brackets to Rack

To fasten the mounting brackets to the rack, use the four nickel plated **12-24** screws as shown in Figure 13. Four screws (two for each bracket) are provided.

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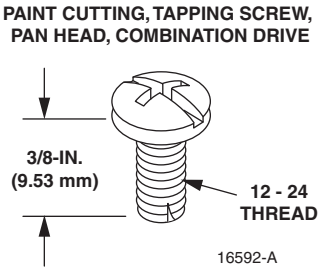

Figure 13. Screw for Attaching Bracket to Rack

4.2.3 Screws to Attach Protective Cover to Fuse Panel

To fasten the plastic protective cover over the power connections, use the tin plate finish **6-32** pan-head screws shown in Figure 14. Four screws (two for each end) are provided.

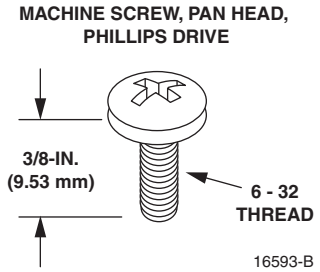

Figure 14. Screw for Attaching Protective Cover to Fuse Panel

4.3 Protective Cover

The protective cover should be installed over the connectors at the rear of the fuse panel when all the wiring connections and tests are completed. To install the plastic protective cover, thread the four 3/8-inch (9.53 mm) long, Phillips-drive, 6-32 pan-head screws into the standoffs located on each output power screw-down barrier strip. Rotate each screw approximately two turns to get it started. Hold the cover so the lettering is oriented properly and then place the cover over the screw heads. Slide the cover to the left and then tighten the screws.

To remove the protective cover, loosen but do not remove the four screws that secure the cover to the panel. Slide the cover to the right and then pull the cover directly outward and away from the panel. The screws do not need to be completely removed to remove the protective cover.

4.4 Cable Management Bar (Accessory for Fuse Panels)

Before installing the fuse panel in the rack, mount the cable management bar (accessory item) on the rear of the panel as shown in Figure 15. Use the 0.25-inch (6.35 mm) long 4-40 screws provided to secure the cable management bar to the panel. Tighten all screws to 9 pound force-inches (1 Newton meter) of torque to insure grounding. The cable management bar can be recess mounted by using the mounting holes closest to the front of the fuse panel.

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Caution: *When attaching the cable management bar to the fuse panel, use only the hardware supplied with the cable management bar. Use of any other hardware could cause contact with internal parts of the fuse panel. If parts are missing, please contact ADC.*

Note: A fuse panel with the cable management bar attached may exceed the 12-inch (3.05 mm) overall depth objective described in GR-63 CORE, 02-14.

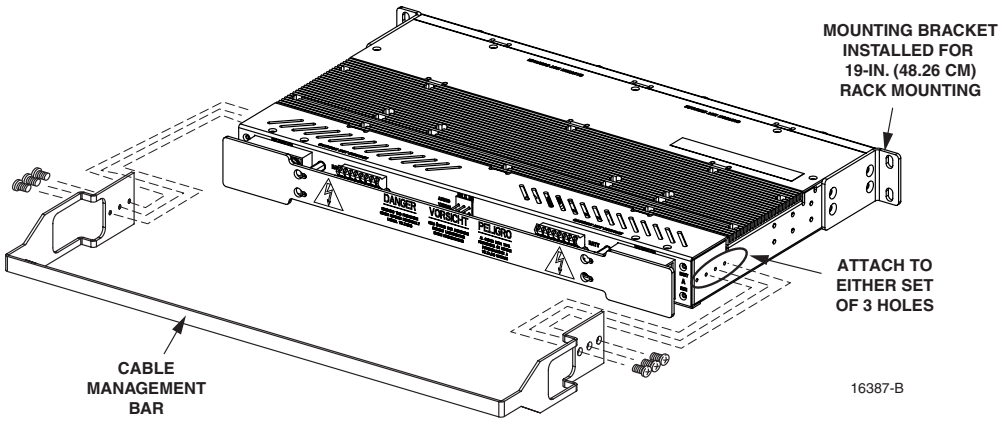

Figure 15. Cable Management Bar Installation (Uninterrupted Power Fuse Panel Shown)

4.5 Rack Mounting

The fuse panel can be mounted in either a 19- or 23-inch (48.26 or 58.42 cm) wide rack. Two sets of mounting brackets, one set for 19-inch racks and one set for 23-inch racks, are provided with the fuse panel. Eight 5/16-inch (7.94 mm) long, thread-forming, Phillips-drive, 8-32 flat-head screws are provided for attaching the mounting brackets to the panel. Four 3/8-inch (9.53 mm) long, Phillips-drive, 12-24 pan-head screws (with #12 flat washers) are provided for attaching the mounting brackets to the equipment rack.

Caution: *When attaching the mounting brackets to the fuse panel, use only the 5/16-inch (7.94 mm) long, black chromate finish, thread forming, flathead screws provided with the panel. Use of any other hardware could cause contact with internal parts of the panel. If parts are missing, contact ADC to order replacement parts.*

Use the following procedure to install the fuse panel in the equipment rack:

1. Select the set of mounting brackets (19- or 23-inch) that correspond to the width of the equipment rack into which the fuse panel will be installed.
2. Orient the mounting brackets as shown in Figure 16.
3. Attach the brackets to the sides of the fuse panel chassis using the eight 5/16-inch (7.94 mm) flathead screws provided. Tighten screws to 15 pound force-inches (1.7 Newton meters) of torque to insure grounding.
4. Place the fuse panel in the specified mounting space within the rack.
5. Secure the panel to the rack as shown in Figure 17 using the four 3/8-inch (9.525 mm) long pan-head screws and flat washers provided.

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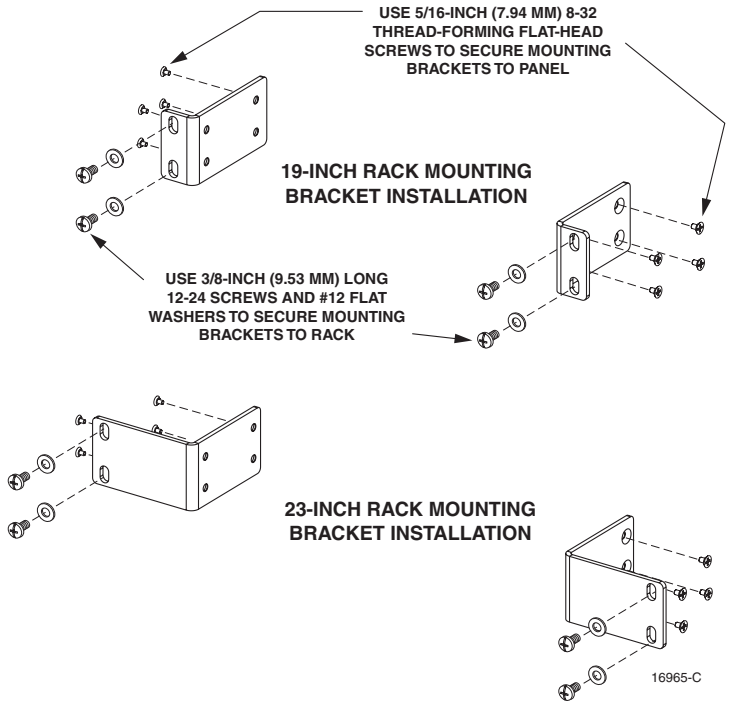
USE 5/16-INCH (7.94 MM) 8-32 THREAD-FORMING FLAT-HEAD SCREWS TO SECURE MOUNTING BRACKETS TO PANEL
19-INCH RACK MOUNTING BRACKET INSTALLATION
USE 3/8-INCH (9.53 MM) LONG 12-24 SCREWS AND #12 FLAT WASHERS TO SECURE MOUNTING BRACKETS TO RACK
23-INCH RACK MOUNTING BRACKET INSTALLATION
16965-C

Figure 16. Fuse Panel Mounting Brackets

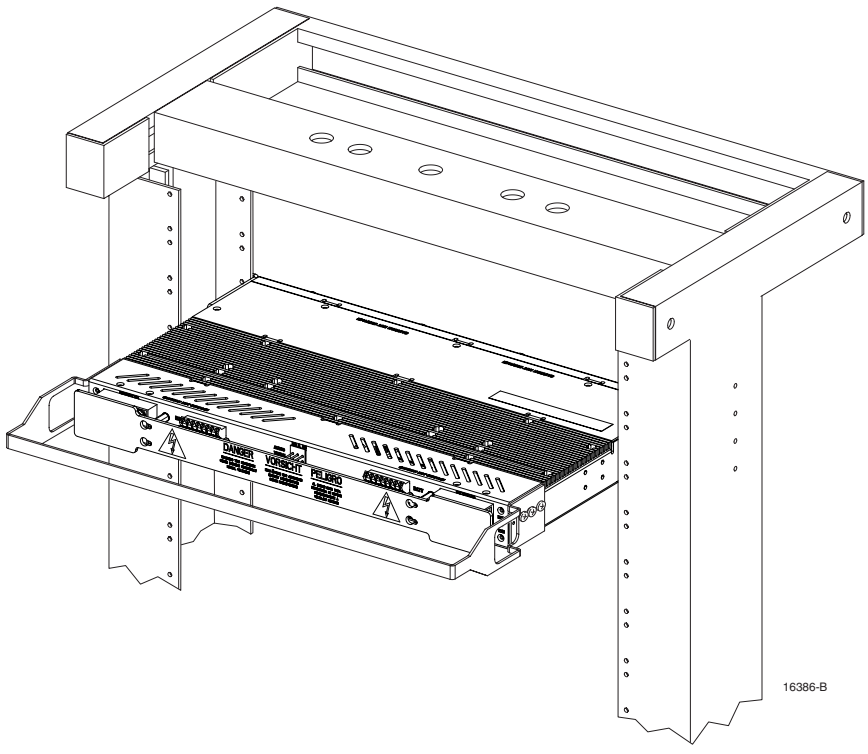

Figure 17. Rear View of Typical Type 70 Fuse Panel Installation in Equipment Rack

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4.6 General Wiring Recommendations

Route and connect ground, power, and alarm cables to the panel connectors according to local practice and the specified procedures. The connections to the fuse panel are shown in Figure 18. After routing the cables, tie them to the cable management bar (optional accessory). Replace the protective cover on the fuse panel after all the wiring connections are made and all tests are completed.

Caution: *Connect both buses of the fuse panel to only –24 Vdc or –48 Vdc.*

Caution: *Connect only the input voltage wire [the wire labeled **BATTERY** or **BATT**, or labeled with the **negative** (–) **voltage polarity** and/or the **voltage value**] to the connector on the fuse panel labeled **BATT** (battery). Connect only the input return wire [the wire labeled **RTN**, **RETURN**, or **BATTERY GROUND,** or labeled with the **positive (+) voltage polarity**] to the connector on the fuse panel labeled **RTN** (return). If the wires are reversed, voltage could be present on the fuse panel chassis and current could flow through the unprotected return wiring in the fuse panel. This condition can cause damage to equipment in the frame in which the fuse panel is installed and to equipment in adjacent frames!*

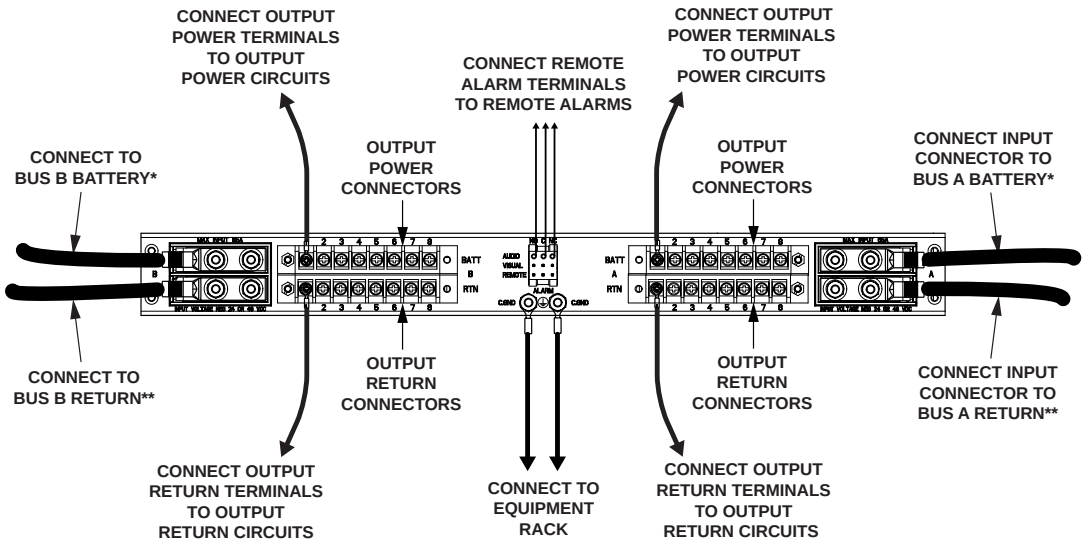
CONNECT OUTPUT POWER TERMINALS TO OUTPUT POWER CIRCUITS
CONNECT REMOTE ALARM TERMINALS TO REMOTE ALARMS
CONNECT OUTPUT POWER TERMINALS TO OUTPUT POWER CIRCUITS
CONNECT TO BUS B BATTERY*
OUTPUT POWER CONNECTORS
OUTPUT POWER CONNECTORS
CONNECT INPUT CONNECTOR TO BUS A BATTERY*
CONNECT TO BUS B RETURN**
OUTPUT RETURN CONNECTORS
OUTPUT RETURN CONNECTORS
CONNECT INPUT CONNECTOR TO BUS A RETURN**
CONNECT OUTPUT RETURN TERMINALS TO OUTPUT RETURN CIRCUITS
CONNECT TO EQUIPMENT RACK
CONNECT OUTPUT RETURN TERMINALS TO OUTPUT RETURN CIRCUITS
*NOTE: CONNECT INPUT VOLTAGE WIRE LABELED "BATTERY," "BATT," "NEGATIVE," "NEG," OR "-" AND/OR THE VOLTAGE VALUE TO THE "BATT" CONNECTOR ("HOT" WIRE).
**NOTE: CONNECT INPUT RETURN WIRE LABELED "RTN," "RETURN," "BATTERY GROUND," "POSITIVE," "POS," OR "BATTERY GROUND" TO THE "RTN" CONNECTOR.
16159-A

Figure 18. Rear View of Type 70 Fuse Panel Cabling (Panel with Compression Lug Input Connectors and Screw-Down Barrier Terminal Strip Output Connectors Shown)

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4.7 Chassis Ground Connection

Mounting the fuse panel on a metal equipment rack using the metal mounting brackets provided with the fuse panel provides a sufficient return path to meet equipment grounding requirements. However, a separate grounding conductor is often required by local practice or local inspectors. A separate chassis grounding conductor is always needed when the fuse panel is mounted to non-grounded or non-conducting material such as a plastic rack or cabinet. When the panel requires separate chassis grounding, the chassis grounding conductor must be sized to match the upstream protection device feeding the panel. This provides an adequate return path capable of allowing the fuse to fail in the unlikely event of a battery wire to chassis fault.

Connect one or both of the chassis ground connectors (labeled C. GND) to the equipment rack ground (see Figure 19), using the following chassis grounding recommendations:

- Chassis grounding conductor connection point: Two #10 studs (with nuts) on 0.625 inch (15.875 mm) centers are provided for connecting a grounding conductor to the fuse panel.
- Chassis ground conductor: Use two #10 AWG wires if using both chassis ground connectors or one #6 AWG wire if using one chassis ground connector. Two #10 crimp ring terminals (for use with #10 AWG wires) are included with the fuse panel.
- Place the ring terminals over the chassis grounding studs and tighten the stud nuts to approximately 15 pound-force inches (1.7 Newton meters) of torque.
- Connect the ground conductors to an approved office ground source per local code or practice.

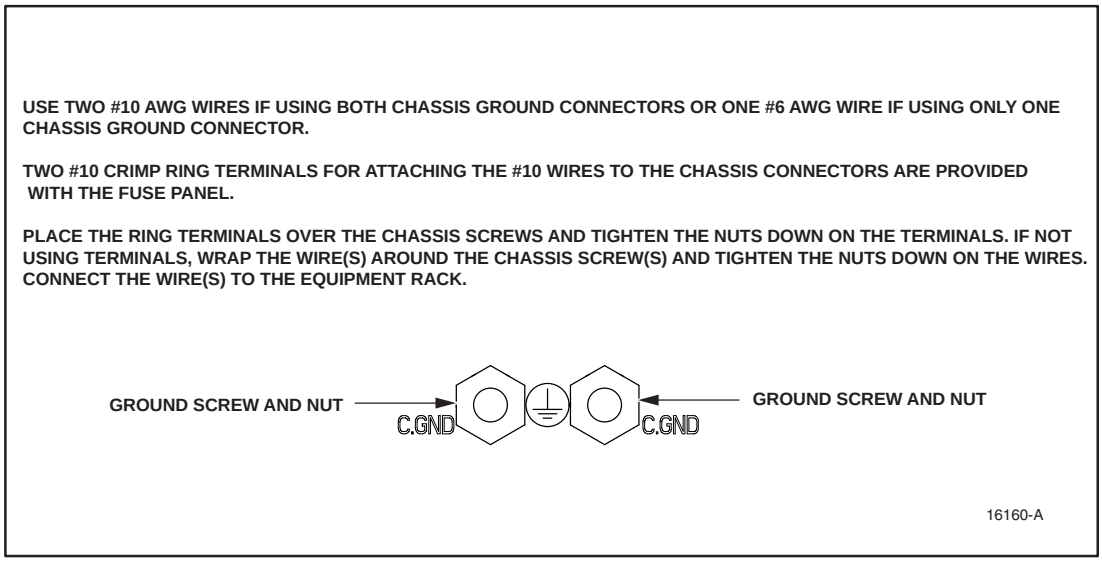
USE TWO #10 AWG WIRES IF USING BOTH CHASSIS GROUND CONNECTORS OR ONE #6 AWG WIRE IF USING ONLY ONE CHASSIS GROUND CONNECTOR.
TWO #10 CRIMP RING TERMINALS FOR ATTACHING THE #10 WIRES TO THE CHASSIS CONNECTORS ARE PROVIDED WITH THE FUSE PANEL.
PLACE THE RING TERMINALS OVER THE CHASSIS SCREWS AND TIGHTEN THE NUTS DOWN ON THE TERMINALS. IF NOT USING TERMINALS, WRAP THE WIRE(S) AROUND THE CHASSIS SCREW(S) AND TIGHTEN THE NUTS DOWN ON THE WIRES. CONNECT THE WIRE(S) TO THE EQUIPMENT RACK.
GROUND SCREW AND NUT
C.GND
C.GND
GROUND SCREW AND NUT
16160-A

Figure 19. Chassis Ground Connection

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4.8 Output Power Connectors

Note: Before connecting the output or input power wires, measure the resistance of each bus input connector as specified in Subsection 5.2, Resistance Test.

Connect the output BATT and RTN terminals for each fuse circuit on each set of terminal strips as follows (see Figure 20):

- Screw-down barrier terminal strip: Use #12 to #22 AWG wire. Wire leads should be equipped with crimp-on spade lugs or ring connectors that have a maximum width of 0.325 inches (8.255 mm).

  The terminals also accommodate copper wire without lugs (insulation stripped back).

  Torque the screws to approximately 9 pound-force inches (1 Newton meter).

- Set screw barrel terminal strip: Use #12 to #24 AWG wire with insulation stripped back.

  Tighten the screws to approximately 4.5 pound-force inches (1 Newton meter).

Caution: *For screw-down barrier terminal strip outputs, use #12 AWG wire to prevent personnel contact with the voltages (NEBs standard, Class A2).*

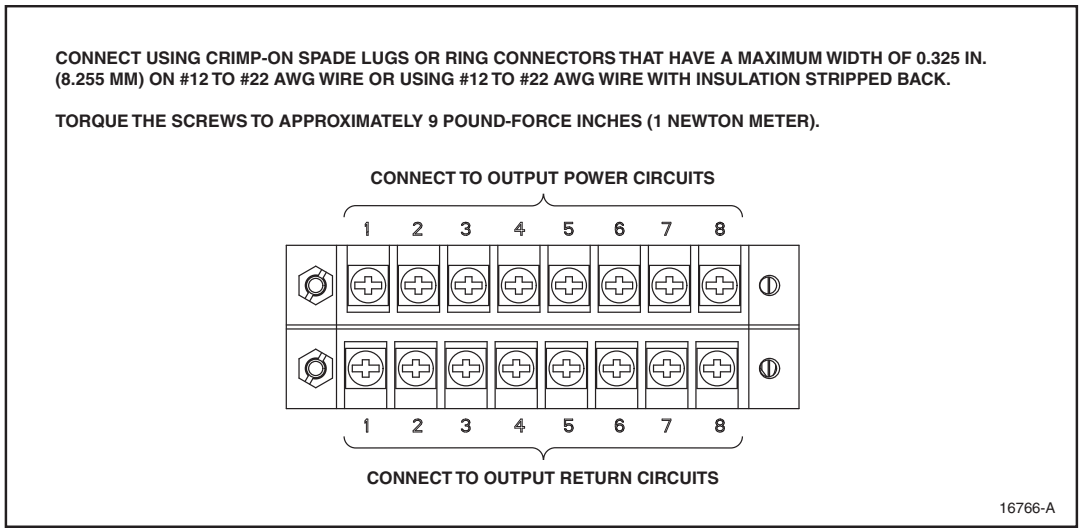
CONNECT USING CRIMP-ON SPADE LUGS OR RING CONNECTORS THAT HAVE A MAXIMUM WIDTH OF 0.325 IN. (8.255 MM) ON #12 TO #22 AWG WIRE OR USING #12 TO #22 AWG WIRE WITH INSULATION STRIPPED BACK.
TORQUE THE SCREWS TO APPROXIMATELY 9 POUND-FORCE INCHES (1 NEWTON METER).
CONNECT TO OUTPUT POWER CIRCUITS
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8
CONNECT TO OUTPUT RETURN CIRCUITS
16766-A

Figure 20. Output Connector Connection (Screw-Down Barrier Terminal Strip Connectors Shown)

4.9 External Alarm Contact Connectors

Connect each set of external alarm contacts to a local alarm system as required (see Figure 21).

Wrap terminal block pins using #22 to #26 AWG copper wire with insulation stripped back.

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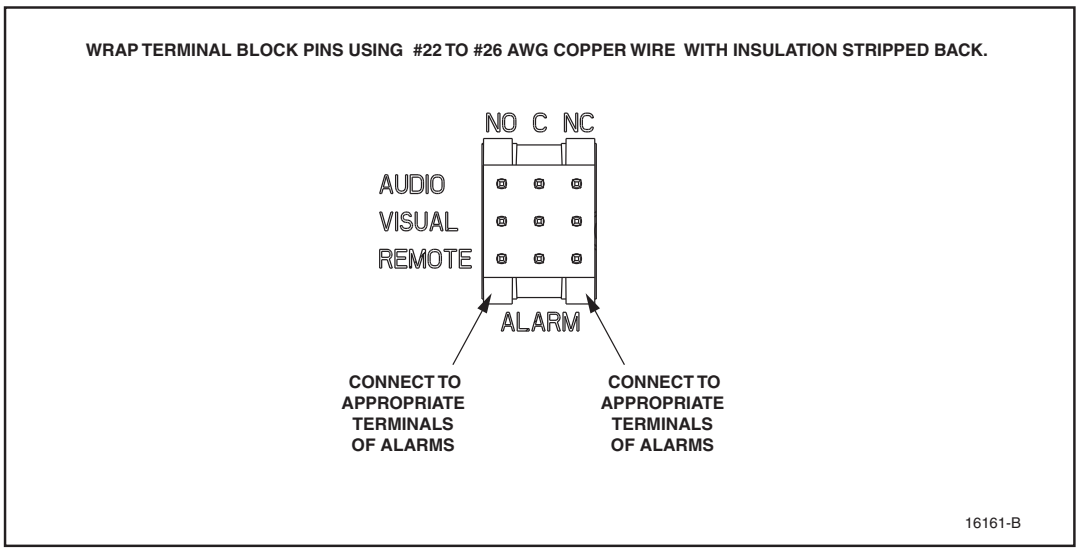

Figure 21. Wire Wrap Alarm Contact Connection

4.10 Input Power Connectors

Note: Before connecting the input or output power wires, measure the resistance at each bus input connector as specified in Subsection 5.2, Resistance Test.

Connect the input power wires to the input power connectors labeled “BATT” and connect the return wires to the return connectors labeled “RTN” for both buses in the fuse panel as shown in Figure 22. Connect input power to the appropriate power sources in accordance with applicable local electrical codes and/or National Electrical Codes but **do not apply power to the panel** until directed to do so.

Caution: *Connect only the input voltage wire [the wire labeled **BATTERY** or **BATT**, or labeled with the **negative** (–) **voltage polarity** and/or the **voltage value**] to the connector on the fuse panel labeled **BATT** (battery). Connect only the input return wire [the wire labeled **RTN**, **RETURN**, or **BATTERY GROUND,** or labeled with the **positive (+) voltage polarity**] to the connector on the fuse panel labeled **RTN** (return).*

Caution: *Caution should be taken to **not reverse input** wires to the fuse panel. Within the fuse panel, the internal battery (negative voltage) wiring is protected and the internal return wiring is **not** protected by fuses. If the wires are reversed, voltage could be present on the fuse panel chassis and current could flow through the unprotected return wiring in the fuse panel. This condition can cause damage to equipment in the frame in which the fuse panel is installed and to equipment in adjacent frames*

- Compression lug connectors: Use the included 2-hole lugs with #6 AWG copper wire (insulation stripped back) or optional 2-hole lugs available as accessories with appropriate AWG copper wire. Tighten the nuts to approximately 16 pound-force inches (1.8 Newton meters).

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- Set screw barrel connectors: Use only the barrel connectors on each connector assembly that are closest to the outside of the fuse panel. Use up to #6 AWG copper wire with insulation stripped back.

Note: Do not loosen the set screws in the two barrel connectors that are closest to the center of the panel. Accessing these connectors may render the warranty void.

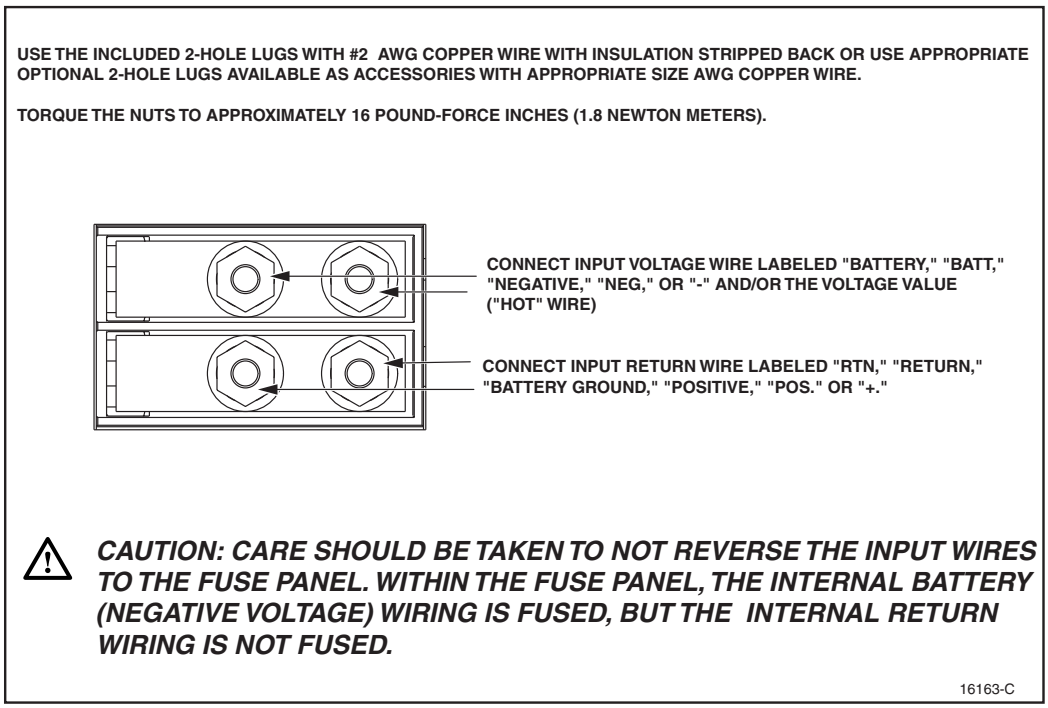
USE THE INCLUDED 2-HOLE LUGS WITH #2 AWG COPPER WIRE WITH INSULATION STRIPPED BACK OR USE APPROPRIATE OPTIONAL 2-HOLE LUGS AVAILABLE AS ACCESSORIES WITH APPROPRIATE SIZE AWG COPPER WIRE.
TORQUE THE NUTS TO APPROXIMATELY 16 POUND-FORCE INCHES (1.8 NEWTON METERS).
CONNECT INPUT VOLTAGE WIRE LABELED "BATTERY," "BATT," "NEGATIVE," "NEG," OR "-" AND/OR THE VOLTAGE VALUE ("HOT" WIRE)
CONNECT INPUT RETURN WIRE LABELED "RTN," "RETURN," "BATTERY GROUND," "POSITIVE," "POS." OR "+."
CAUTION: CARE SHOULD BE TAKEN TO NOT REVERSE THE INPUT WIRES TO THE FUSE PANEL. WITHIN THE FUSE PANEL, THE INTERNAL BATTERY (NEGATIVE VOLTAGE) WIRING IS FUSED, BUT THE INTERNAL RETURN WIRING IS NOT FUSED.
16163-C

Figure 22. Input Power Connection (Compression Lug Connectors Shown)

4.11 Designation Strips and Perforated Cards

Separate the perforated strips from the card and mark the strip with the circuit designation/fuse value for each circuit/fuse on the bus. Insert the perforated strip into the designation strip, under the clear plastic, and position the strip so that the designation on the perforated strip is positioned above the corresponding fuse

4.12 Fuse Designation Card Holder and Card

Attach the fuse designation card holder to the fuse panel, to one of the panel mounting brackets, to a part of the rack, or at a location close to the panel, as desired. Remove the backing from the back of the card holder and press the card holder against the mounting surface.

Fill out one of the cards (see Figure 8) with required circuit information and insert it in the card holder.

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4.13 Voltage Designation Label

Write the voltage used in the fuse panel on the voltage designation label (see Figure 9) and attach the label to the back of the panel.

5 TESTING

⚠ **Caution:** *This equipment employs electrical voltage and amperage levels which may be considered an electrical hazard. Care should be exercised to assure that only qualified personnel are allowed to install, operate, maintain, or otherwise come in contact with the fuse panel when it is energized. Only insulated tools should be used on energized elements of the panel.*

5.1 Quality Control

Each unit is thoroughly tested at the ADC factory. The following tests are recommended, however, to assure that no damage has occurred during shipping or handling. Both bus A and bus B circuits need to be tested. The tests in Subsection 5.2, Resistance Test and Subsection 5.3, Wiring Connections Torque Measurements must be performed without power applied to the fuse panel.

5.2 Resistance Test

⚠ **Caution:** *Before performing this test, verify that the input and output power is not applied to the fuse panel connectors,*

Measure the resistance at each bus input connector using a multi meter connected to the BATT and RTN input terminals. A resistance of at least 500 ohms should be read on the meter (some meters will indicate a resistance of several Megohms because their input voltage is not high enough to break down the forward conductance of the diodes used in the alarm circuit). Any resistance higher than 500 ohms is acceptable.

5.3 Wiring Connections Torque Measurements

Measure the torque of all input, output, and fuse failure alarm relay contact connections included in the non-powered testing paragraphs above using a torque screwdriver that is calibrated in pound-force inches or Newton meters. The torque specifications are printed on the rear of the fuse panel adjacent to each connector.

5.4 Power Indication Test

After checking input resistance and verifying the wiring connections torque, power may be applied to the fuse panel. Upon power application, the alarm indicators should not light unless there is a fuse that has failed. The alarm relay contacts should provide an open circuit between the common (C) terminals and the normally open (NO) terminals and a closed circuit between the common (C) and normally closed (NC) terminals.

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5.5 Connection Polarity Test

To verify that the input power wires are connected to the correct terminals, measure the voltage between the input return connector (RTN) and the chassis ground using a multi meter. The voltage should be less than 2.0 Vdc. If the voltage is more than 2.0 Vdc, reverse the input power wires and measure the voltage between the input return connector (RTN) and the chassis ground again to determine that the voltage is less than 2.0 Vdc.

5.6 Fuse Alarm Test

Place a fuse that has failed in one of the fuse positions on each bus. The visual fuse alarm indicators (LED) for the bus will change from unlighted to a red light, and the fuse failure alarm relay will operate. Replace the failed fuses with known good fuses.

6 OPERATION

⚠ **Caution:** *This equipment employs electrical voltage and amperage levels which may be considered an electrical hazard. Care should be exercised to assure that only qualified personnel are allowed to install, operate, maintain, or otherwise come in contact with the fuse panel when it is energized. Only insulated tools should be used on energized elements of the panel.*

All fuse panel circuits are operational as soon as power is applied to the input connectors. The alarm indicator should not light when power is applied.

Operation of the fuse panel consists of removing and replacing fuses when they fail. If a fuse fails, the alarm LED indicator for the bus lights, and the external and remote alarms are activated (if present).

7 MAINTENANCE

⚠ **Caution:** *This equipment employs electrical voltage and amperage levels which may be considered an electrical hazard. Care should be exercised to assure that only qualified personnel are allowed to install, operate, maintain, or otherwise come in contact with the fuse panel when it is energized. Only insulated tools should be used on energized elements of the panel.*

7.1 Inspection

Inspect the fuse panel periodically (every six months is recommended) for damage to the fuses, damaged or broken wires on the power outputs and the external alarm connections. Inspect for excessive dust and dirt that block the vents.

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7.2 Cleaning

If excessive dirt is found during the inspection, brush or wipe dust and dirt from the fuse panel with a soft bristle brush or soft cloth. Care should be taken not to damage the fuses or any wiring.

7.3 Adjustments

No adjustments in the field are indicated or required. If a circuit is not operating properly, contact ADC Customer Assistance (see Section 8, Customer Information and Assistance).

7.4 LED Replacement

The power-on and fuse alarm LEDs may be replaced as follows:

1. Pull LED out slowly from the front of the fuse panel.
2. Disconnect both tabs on the LED from the mating terminals (quick-connects or fastons) on the wires.
3. On the replacement LED, connect the tin tab to the mating terminal on the red wire, and connect the brass tab to the mating terminal on the black wire.
4. Push the LED back into the panel.

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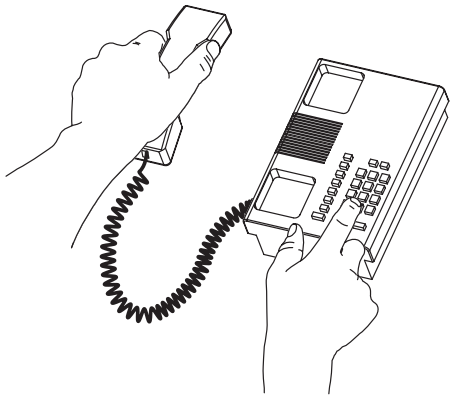
8 CUSTOMER INFORMATION AND ASSISTANCE

PHONE:



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ADC EUROPEAN CUSTOMER SERVICE, INC
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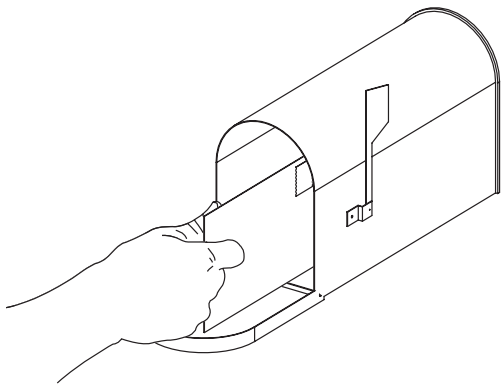
1930 ZAVENTEM, BRUSSELS, BELGIUM



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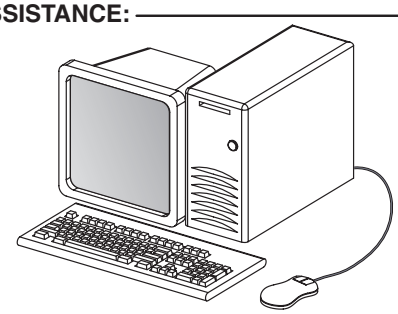

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